

## CLAIMS

1. A fixed angle wing lift type horizontal shaft wind power generating device with a start assisting function,  
5 comprising:

a permanent magnet type generator for generating in connection with the rotation shaft of a rotation wing which is rotated in the forward direction by wind;

a start assistance unit for switching the  
10 generator to a motor and performing a start assisting rotation which rotates the rotation shaft in the forward direction; and

a generation restoring unit for restoring the motor to the generator when the start assisting rotation  
15 by the start assisting unit is suspended.

2. The fixed angle wing lift type horizontal shaft wind power generating device according to claim 1, wherein  
said start assistance unit comprises a storage  
20 battery, a solar cell or an auxiliary wind power generator as a power supply for performing the start assisting rotation.

3. The fixed angle wing lift type horizontal shaft wind  
25 power generating device according to claim 1 or 2,

further comprising

a start assisting rotation time determining unit for determining when said start assistance unit performs the start assisting rotation.

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4. The fixed angle wing lift type horizontal shaft wind power generating device according to claim 3, wherein

said start assisting rotation time determining unit further comprises

10 a wind velocity measuring unit; and  
a first time counting unit,

wherein

if wind velocity measured by said start assisting rotation time determining unit is lower than a  
15 predetermined velocity, said start assisting rotation time determining unit operates said start assistance unit only during a time counting period of said first time counting unit.

20 5. The fixed angle wing lift type horizontal shaft wind power generating device according to claim 4, wherein

said start assisting rotation time determining unit further comprises

a second time counting unit,

25 wherein

after the time counting period of said first time counting unit is over, said start assisting rotation time determining unit starts time counting by said second time counting unit, and after the time counting  
5 period of said second time counting unit is over, said start assisting rotation time determining unit starts wind velocity time counting by said wind velocity measuring unit.

10 6. The fixed angle wing lift type horizontal shaft wind power generating device according to claim 5, wherein  
the time counting period of said first time counting unit is shorter than the time counting period of said second time counting unit.

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7. The fixed angle wing lift type horizontal shaft wind power generating device according to claim 1, wherein  
the number of rotations of a windmill is counted using pulsating current of output voltage from a  
20 generator when the wind is weak and using pulsating current of charging current when the wind is strong.

8. A method for operating a fixed angle wing lift type horizontal shaft wind power generating device  
25 comprising a permanent magnet type generator for

generating in connection with the rotation shaft of a rotation wing which is rotated in the forward direction by the wind, a switch unit for switching the generator to a motor, a wind velocity measuring unit, a first time  
5 counting unit and a second time counting unit having a time counting period longer than a time counting period of the first time counting unit, comprising:

operating a start assisting function when the wind velocity measuring unit detects a wind velocity lower  
10 than a predetermined velocity;

continuing operation of the start assisting function only during a time counting period of the first time counting unit;

suspending the operation of the start assisting  
15 function during a time counting period of the second time counting unit and switching the motor to the generator by the switch unit;

repeating the start assisting rotation process and generator restoration process;

20 monitoring whether the output voltage from a coil stator of the generator is equal to or more than a predetermined voltage during the repetition process; and

charging a battery with the output voltage of the  
25 generator when having detected a voltage higher than

the predetermined voltage in the voltage monitoring process.

9. A wind power generating device, comprising:

5       a rectification circuit connected to a wind power generator for generating AC voltage;

          a DC/DC conversion circuit including at least one switching device, connected to the rectification circuit, for converting a level of DC output voltage  
10      of the rectification circuit by on/off control of the switching device;

          a rotation speed detection unit for detecting a rotation speed of the wind power generator;

          a limited rotation speed signal generating unit  
15      for generating a signal for indicating the limited rotation speed of the wind power generator;

          a comparison unit for comparing a signal for indicating detected speed obtained from the rotation speed detection unit with a signal for indicating  
20      limited rotation speed obtained from the limited rotation speed signal generating unit;

          a switch control circuit for controlling the switching device in such a way that output voltage of the DC/DC conversion circuit may become a predetermined  
25      value and also in such a way as to increase the output

voltage of the DC/DC conversion circuit in response to output of the comparison unit, indicating that the detected speed is higher than the limited rotation speed;

5           a start assistance unit for switching the wind power generator to a generator and performing start assisting rotation of rotating the rotation shaft in a forward direction; and

          a generation restoring unit for restoring the  
10 wind power generator to the generator when the start assisting rotation by the start assistance unit is suspended.

10. A wind power generating device, comprising:

15 a rectification circuit connected to a wind power generator for generating AC voltage;

          a DC/DC conversion circuit including at least one switching device, connected to the rectification circuit, for converting a level of DC output voltage  
20 of the rectification circuit by on/off control of the switching device;

          a DC/AC conversion circuit connected to the DC/DC conversion circuit;

          a rotation speed detection unit for detecting a  
25 rotation speed of the wind power generator;

a limited rotation speed signal generating unit for generating a signal for indicating the limited rotation speed of the wind power generator;

5 a comparison unit for comparing a signal for indicating detected speed obtained from the rotation speed detection unit with a signal for indicating limited rotation speed obtained from the limited rotation speed signal generating unit;

10 a control circuit for controlling the DC/AC conversion circuit and also controlling the DC/AC conversion circuit in such a way as to increase the output voltage of the DC/AC conversion circuit in response to output of the comparison unit, indicating that the detected speed is higher than the limited  
15 rotation speed;

a start assistance unit for switching the wind power generator to a generator and performing start assisting rotation of rotating the rotation shaft in a forward direction; and

20 a generation restoring unit for restoring the wind power generator to the generator when the start assisting rotation by the start assistance unit is suspended.

25 11. The wind power generating device according to claim

9 or 10, wherein

said limited rotation speed signal generating unit generates a signal for indicating first rotation control speed and a second limited rotation speed lower  
5 than the first limited rotation speed in a daytime zone and in a night time zone, respectively.

12. A wind power generating device, comprising:

a windmill;

10 an AC generator provided with a rotor rotated by the windmill;

a rectification circuit connected to the AC generator;

15 a power conversion circuit connected to the rectification circuit;

a storage battery or a capacitor connected to the power conversion circuit;

a rotation detector for detecting the number of rotations of the windmill;

20 a reference rotation number setter for setting the reference number of rotations of the windmill;

a control circuit connected to the rotation detector, reference rotation number setter and power conversion circuit, for controlling the power  
25 conversion circuit in such a way as to increase the ratio

between the input voltage and the output voltage of the power conversion circuit when the detected number of rotations obtained from the rotation detector exceeds the reference number of rotations;

5        a start assistance unit for switching the AC generator to a motor and performing a start assisting rotation which rotates the rotation shaft in the forward direction; and

10        a generation restoring unit for restoring the motor to the AC generator when the start assisting rotation by the start assistance unit is suspended.

13. The wind power generating device according to claim 12, further comprising

15        an input voltage detection circuit for detecting input voltage of said power conversion circuit, wherein

      said control circuit comprises

20        a generator output voltage determining unit for determining output voltage of said AC generator;

      a first subtraction unit for calculating a difference between the detected number of rotations and the reference number of rotations;

25        a coefficient generating unit for transmitting 1 and a value less than 1 as a coefficient

when the difference is zero or less and when the difference is more than zero, respectively;

a multiplication unit for generating a correction voltage specifying signal by multiplying  
5 determined output voltage obtained from the generator output voltage determining unit by the coefficient obtained from the coefficient generating unit;

a second subtraction unit for calculating a difference between output of the multiplication unit  
10 and output of the input voltage detection circuit; and

a control signal generating circuit for generating a signal for controlling said power conversion circuit in such a way as to bring output of the input voltage detection circuit close to the  
15 correction voltage specifying signal, based on output of the second subtraction unit.

14. A lift type fixed pitch horizontal windmill, comprising:

20 a short-circuit unit for short-circuiting output of a generator and making a blade of the windmill continue to rotate slowly, when wind blows at speed exceeding an operational limit.

25 15. The lift type fixed pitch horizontal windmill

according to claim 14, further comprising

a determination unit for determining whether to  
re-start the windmill by comparing short-circuit  
current generated by said short-circuit unit with a  
5 predetermined threshold value.

16. A lift type fixed pitch horizontal windmill,  
comprising:

a short-circuit unit for short-circuiting the  
10 input of a wind power generator when the windmill cannot  
be suspended although voltage of a battery has dropped  
or output voltage of a generator has increased.

17. A lift type fixed pitch horizontal windmill,  
15 comprising:

a storage unit for storing information about a  
fluctuation trend of previous wind velocity; and

a control unit for predicting future wind velocity,  
according to the information stored in the storage unit  
20 and controlling the windmill in such a way that rotation  
of the windmill can follow fluctuations of wind velocity  
at high speed.

18. A lift type fixed pitch horizontal windmill, wherein  
25 when wind velocity increases while the windmill

is rotating at a preset upper limit of number of rotations and charging power exceeds a rated power value, the charging power is prevented from exceeding the rated power.